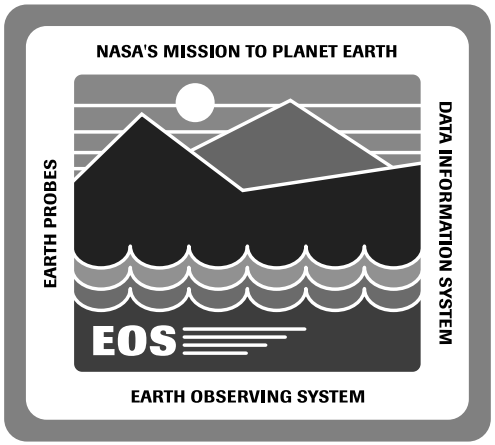
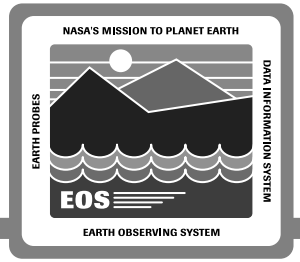


Operations Configured Items (CI)

Ronald A. Jones

18 October 1995

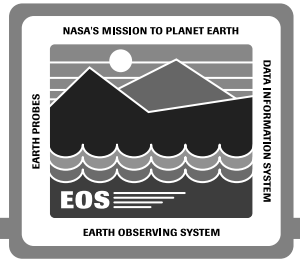
Configured Items List



Under FOT configuration control

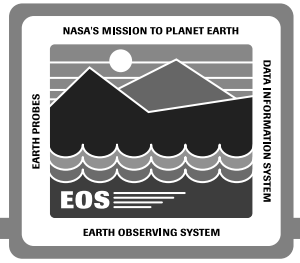
- **ECL (ECS Command Language) Command Procedures (CPs)**
- **Activities (part of PDB)**
- **Baseline Activity Profile (BAP)**
- **Relative Time Command Sequence (RTCS)**
- **Telemetry Monitor (TMON)**
- **Displays: Pages/Rooms**
- **Project Database (PDB)**

Configured Items Description



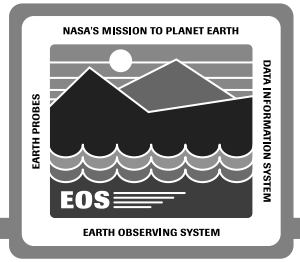
- **CI's are those data files used by operations to configure/control the ground system and spacecraft.**
- **CI's are configuration controlled by operations**
- **CI's are built at EOC User Stations or IST Workstations by FOT/IOT personnel using FOS provided tools.**
  - **Spacecraft/Ground: FOT**
  - **Instruments: IOT**
- **Categories**
  - **Spacecraft Bus**
  - **Instruments**
  - **Ground**

Command Procedures (CP)



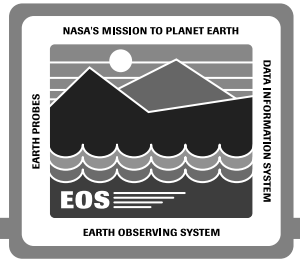
- **Written in ECS Command Language**
  - **Similar to GSFC and OASIS STOL**
  - **Stored and executed at EOC**
- **Primary ground mechanism used by FOT to configure / re-configure both ground and space segments**
- **Each CP performs a specific S/C Bus, Instrument or Ground Function:**
  - **Example 1: Turn on an earth sensor**
  - **Example 2: Place Instrument into particular Mode**
  - **Example 3: Pre-Contact configuration of EOC**
- **Contains:**
  - **Individual S/C commands**
  - **ECL Directives (i.e. SNAP PAGE)**
  - **Comments**
  - **Nesting (call another CP)**
  - **Parameters (optional)**
  - **Programming Logic (i.e. IF-THEN-ELSE, GOTO, WAIT,...)**

Command Procedures (cont.)



- **Executed only by ground (not on the spacecraft)**
  - **Ground Script**
  - **Manually Entered**
- **Activated by: FOT Command Activity Controller**
- **Classification**
  - **Nominal**
  - **Contingency**
- **Tool: *Procedure Editor***

Procedure Editor



Procedure Editor

File Edit Tools Help

Procedure: Fire_Thruster Type: Command

<<<Procedure Text>>>

Loaded 36 lines (496 bytes) from cmdProcs/Fire_Thruster

Go To: Validate PASS Check Syntax PASS

Command Builder

Directive Keywords

<<< List of Keywords >>>

Filter

All

- AM1-MISR
- AM1-CERES
- AM1-COMMS

Commands

<<< List of Cmd Mnemonics >>>

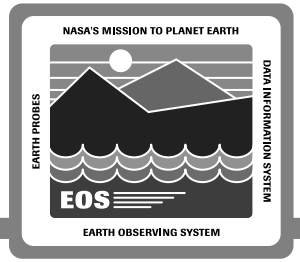
Parameters

<<< List of Parameters >>>
(analog and discrete)

Qualifiers

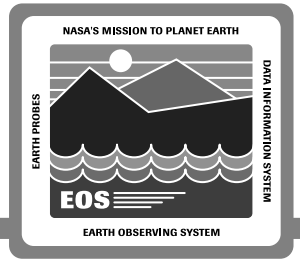
<<< List of Qualifiers >>>
(discrete only)

Activities



- **Activity corresponds to a S/C Bus, Instrument or Ground Operation**
- **Expands into a set of S/C Commands or ECL directives**
- **Building Blocks for Baseline Activity Profiles (BAP)**
- **Contains:**
  - **Individual S/C Commands**
  - **ECL Directives**
  - **Comments**
  - **Calls to ECL Command Procedures**
  - **Parameters (optional)**
  - **Consumables: Power, Data Rate (optional)**

Activities (cont.)



Provides ability to utilize relative timing (relative to start of activity)

- **Example:**

  G-01:00 DIR_1 (DIR_1 EXE 1 min. before CMD_3)

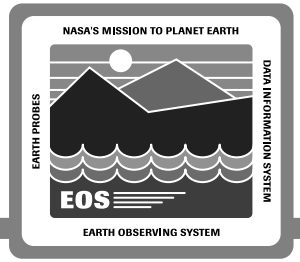
  A-00:30 CMD_2 (CMD_2 EXE 30 sec. before CMD_3)

  A+00:00 CMD_3

  A+00:30 CMD_4 (CMD_4 EXE 30 sec. after CMD_3)

- **Output Classification**
  - **ATC Load**
  - **Ground Script**

Activities (cont.)



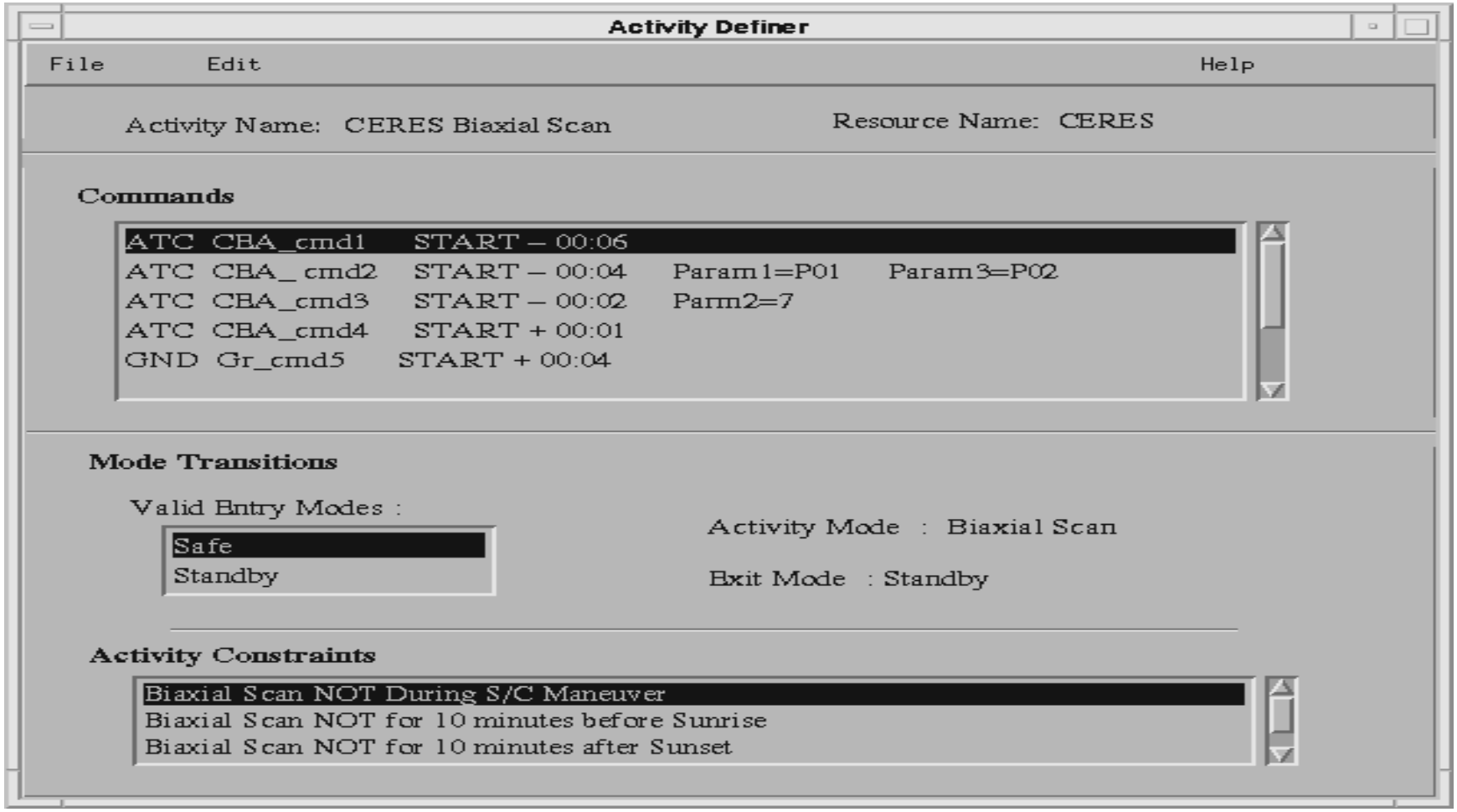
Used to generate:

- **Ground Script**
  - **Typically covers one 24 hour operation day**
  - **Stored and executed in EOC**
  - **Absolute Timing (GMT)**

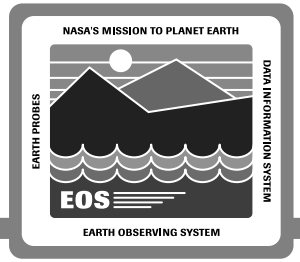
    Used by FOT to accomplish pre-contact and post-contact functions
  - **Relative Timing**

    Used by FOT to accomplish contact functions (ex. RT commanding, ATC load uplink)
- **Absolute Time Commands**
  - **Typically covers one 24 hour operation day**
  - **Uplinked and Stored on S/C**
  - **Absolute Timing (S/C time)**
  - **Executed by S/C at appropriate time**
- **Tool: *Activity Definer***

Activity Definer

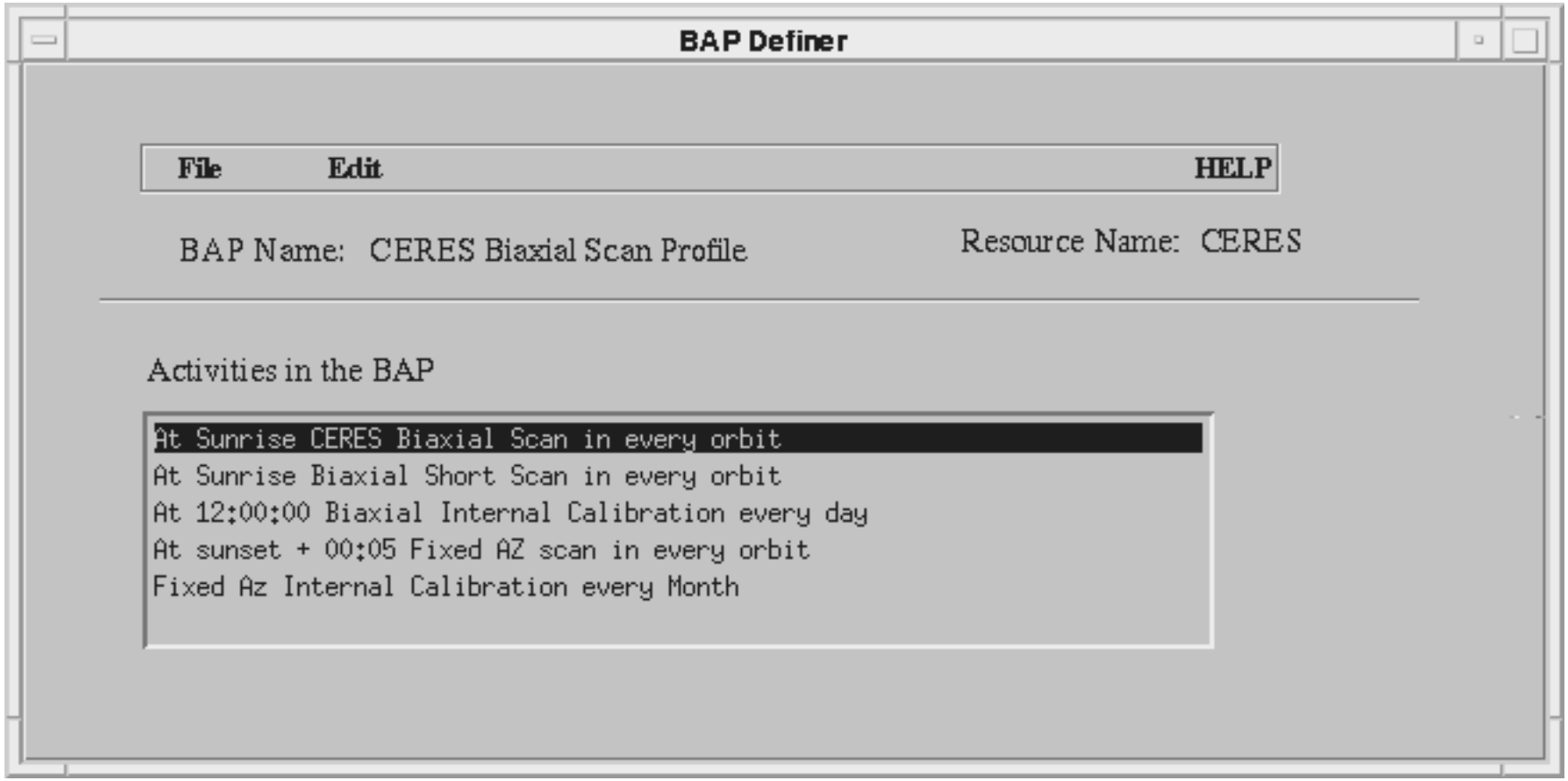


Baseline Activity Profile (BAP)



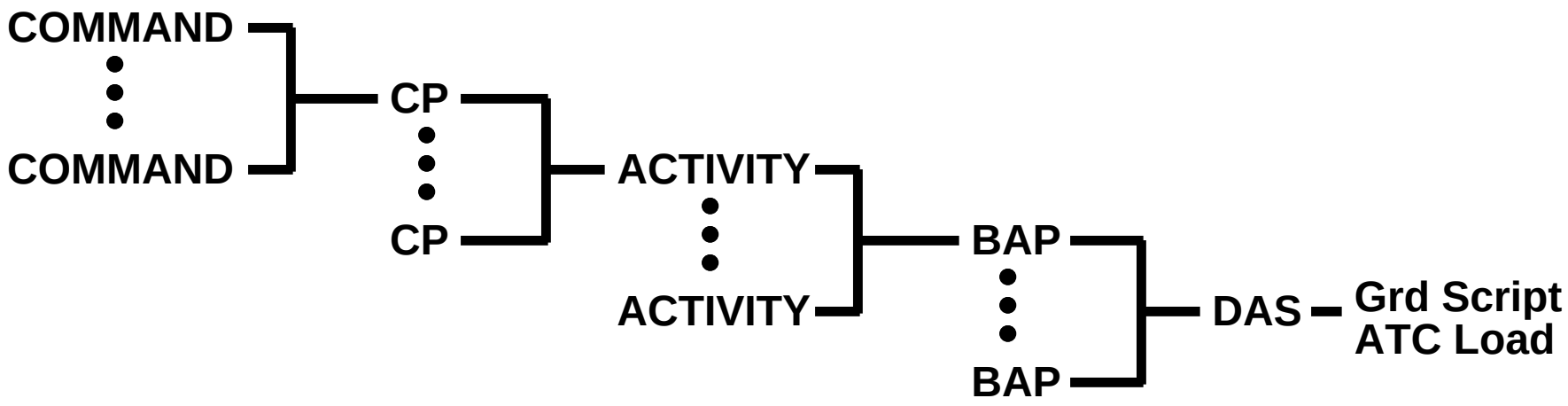
- **BAPs are defined for normal or routine operations of the S/C Bus, Instrument or Ground**
- **Building Blocks for Detailed Activity Schedule (DAS)**
- **Contains Activities which are Event Driven**
  - **Sun Rise**
  - **Sun Set**
  - **Equator Crossings**
  - **etc.**
- **Stored in EOC**
- **Tool: *BAP Definer***

BAP Definer

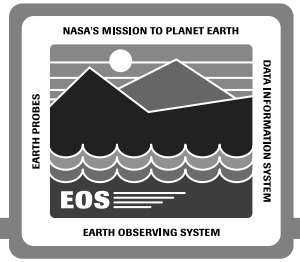

BAP Definer
File
Edit
HELP
BAP Name: CERES Biaxial Scan Profile
Resource Name: CERES
Activities in the BAP
At Sunrise CERES Biaxial Scan in every orbit
At Sunrise Biaxial Short Scan in every orbit
At 12:00:00 Biaxial Internal Calibration every day
At sunset + 00:05 Fixed AZ scan in every orbit
Fixed Az Internal Calibration every Month

Ground Script and ATC Evolution

S/C Command Ground Directive	S/C or Grd Function	S/C or Grd Activity	Sequence Of Activities	Accumulation Of BAP & Activities

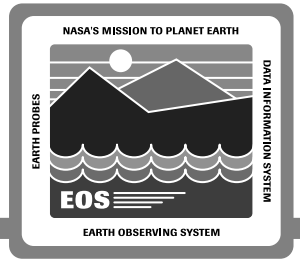


Relative Time Command Sequence (RTCS)



- **Used to perform the same Spacecraft activity on a ROUTINE Basis**
  - **Stored and executed on S/C**
- **Each RTCS performs a specific S/C Bus/Instrument Function**
- **A RTCS may contain individual S/C commands or call other RTCS's**
- **Use relative timing starting at time of RTCS execution**
- **Activated by:**
  - **Real-Time S/C command from ground during contact**
  - **Another RTCS**
  - **ATC Load Command**
  - **TMON**
- **Tool: *RTS Load Builder***

RTS Load Builder



RTS Load Builder

File Edit Utility Help

RTS Number: 032 RTS Subsystem: AM1 - COMMS

Uplink Window

Start Time: **Stop Time:** **Select Time**

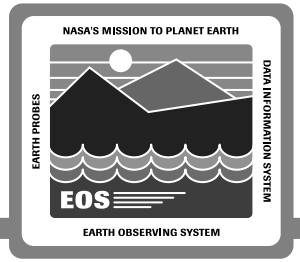
Name: RTS032 <<< max. 30 characters >>>

<<<RTS Commands>>>

RTS 32 Loaded for AM1

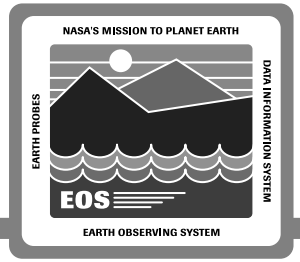
Go To: **Validate** **Generate**

Telemetry Monitor (TMON)



- **Backup to S/C Bus & Instrument Failure Detection and Recover S/W**
  - **Stored and executed on S/C**
- **Each TMON monitors a specific S/C Bus or Instrument Concern**
- **Use by S/C to:**
  - **Monitor telemetry**
  - **Detect Out Of Limit (OOL) conditions**
  - **If OOL then respond by:**
    - **Executing S/C Command**
    - **Executing RTCS**
    - **Enable Stored Command Inhibit Group**
- **Tool: *TMON Builder***

Displays: Pages/Rooms



- **Pages displayed at EOC User Stations and IST Workstations as windows**
- **Various types of displays available:**
  - **Alphanumeric Displays**

    Used to view Discrete and Analog telemetry parameters, Limit Violations & Data Quality.
  - **Graphs**

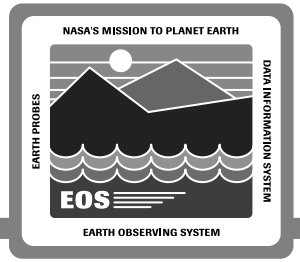
    Up to 6 TLM parameters per Graph

    TLM vs. Time

    TLM vs. TLM
  - **Tables**

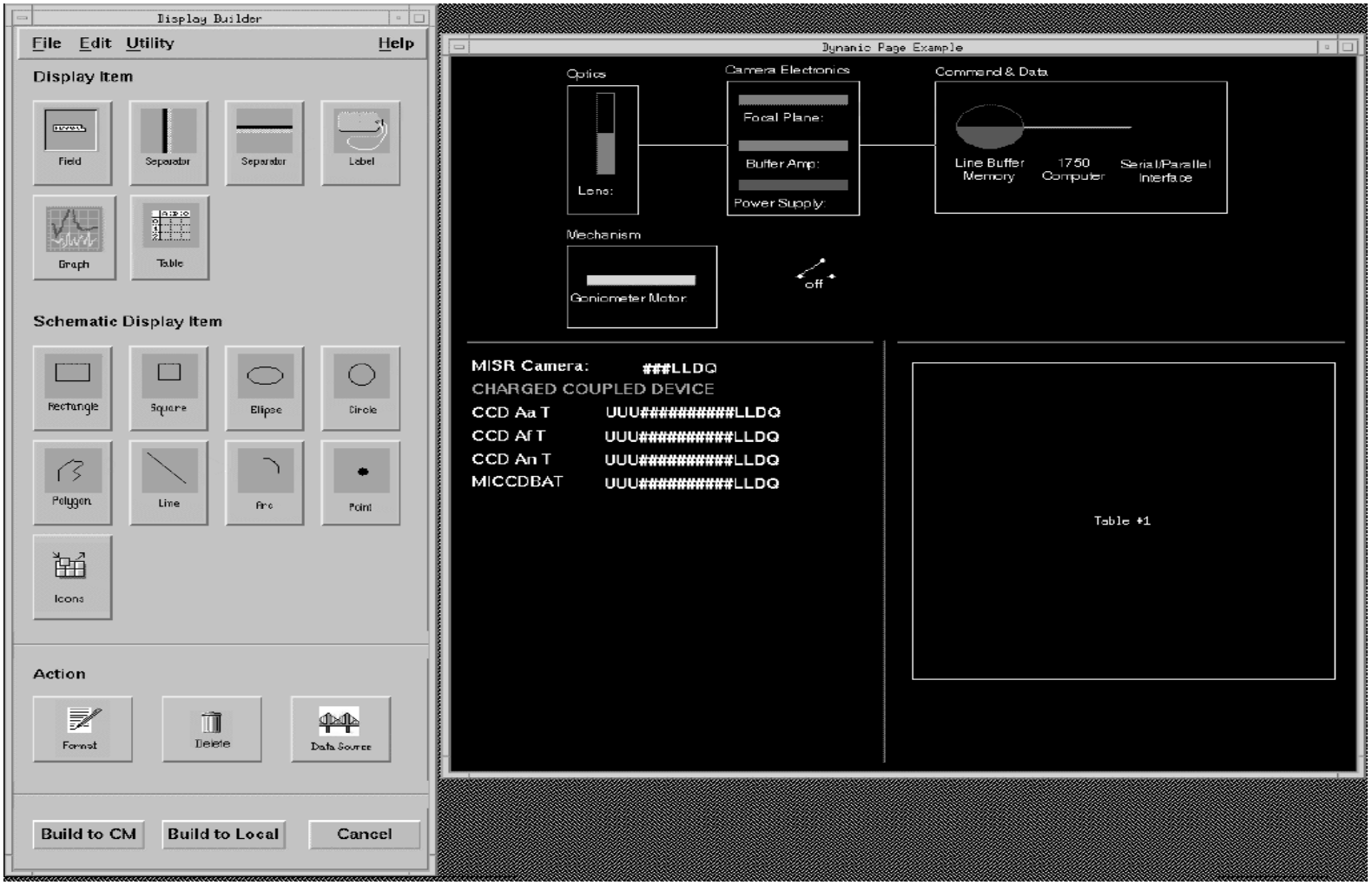
    Display up to 50 COLUMNS of TLM values and their associated Time

Pages/Rooms (cont.)

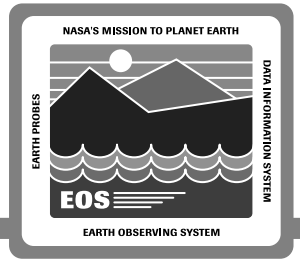


- Two Dimensional Schematic Display
  - Visual representation of TLM parameters
  - Items can change color according to TLM para Limits
- Rooms include one or more Pages
  - FOT/IOT can save rooms for later call-up
- Tool: ***Display Builder***

Display Builder, Dynamic Page Example



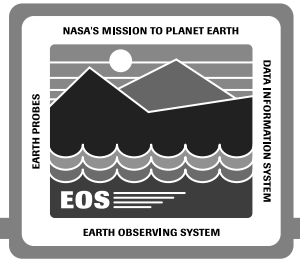
PDB



Contains:

- **Command Definitions**
  - **Command Mnemonics/Subfields**
  - **Prerequisite Checks**
  - **End Item Verifiers**
  - **Constraints**
- **Telemetry Definitions**
  - **Telemetry Mnemonics**
  - **Limits**
  - **Calibration Curves**
  - **Discrete State Definitions**
  - **Context Dependency**
  - **Derived Parameters (consist of up to 6 TLM Mnemonics)**

PDB (cont.)



- **Activity Definitions**
  - **Activity Name**
  - **Constraint**

PDB Access

- **FOT/IOT: Edit, Report**
- **FOT DBA: Load, Edit, Validate, Generate, Report**

Tools: **FOS Database Utilities**

FOS Database Utilities Menu
IOT/FOT